March 2004 NC Weather Review

Overview

Weather highlights across North Carolina during March 2004 included a warm period at the beginning of the month, followed by an unusual widespread high wind event, and a period of record cold. The month ended with snow in the mountains and hail producing thunderstorms over the Piedmont. Overall, the month averaged slightly warmer and much drier than the 30 year climatologically normal.

One of more significant weather aspects to March 2004 was the lack of precipitation (Figure 1). Significant widespread precipitation was limited to one rainfall event that occurred on March 15th through the 17th. The below normal precipitation in March was a continuation of a trend that began in January 2004 (Figure 2). Precipitation for the first three months of 2004 was below normal at most reporting stations in North Carolina. In March, nearly all of the reporting stations across the state received less than 50 percent of their normal precipitation. In fact, many locations across the extreme southern portion of the state received less than 10 percent of normal.

Fayetteville recorded their driest March on record with only 0.28 inches of rain during March 2004. Other rainfall totals reported during March 2004 included: Asheville 2.02 inches (2.57 inches below normal), Charlotte 1.61 inches (2.78 inches below normal), Elizabeth City 3.12 inches (1.55 inches below normal), Hickory 2.40 inches (2.52 inches below normal), Greensboro 1.61 inches (2.24 inches below normal), Raleigh 3.31 inches (0.72 inches below normal), and Wilmington 1.85 inches (2.37 inches below normal).

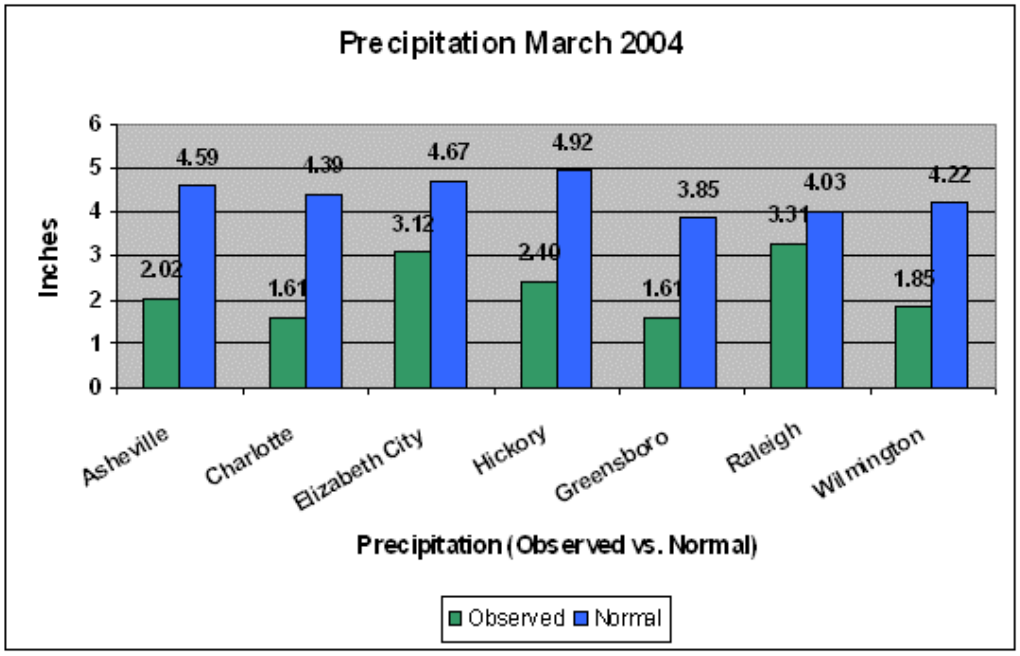

Figure 1 Precipitation totals for selected locations across NC during March 2004.

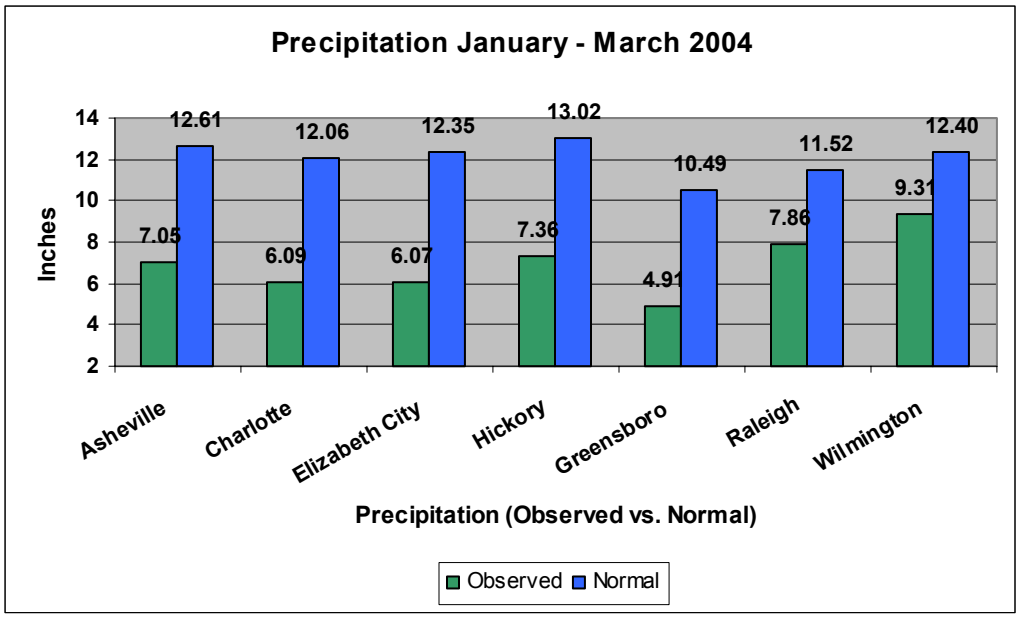

Figure 2 Precipitation totals for selected locations across NC from during January, February and March 2004.

Temperatures across North Carolina during March averaged slightly above normal with the exception of the Outer Banks, where readings were slightly below normal. The warm period at the beginning of the month was primarily responsible for the slightly above normal monthly temperatures. Average temperatures for March 2004 included: Asheville 49.5° (3.2 degrees above normal), Charlotte 53.8° (1.0 degrees above normal), Elizabeth City 51.8° (0.2 degrees above normal), Hickory 52.2° (2.2 degrees above normal), Greensboro 51.2° (2.1 degrees above normal), Raleigh 52.6° (1.9 degrees above normal), Wilmington 55.6° (0.6 degrees above normal), and Cape Hatteras 50.5 (1.9 degrees below normal).

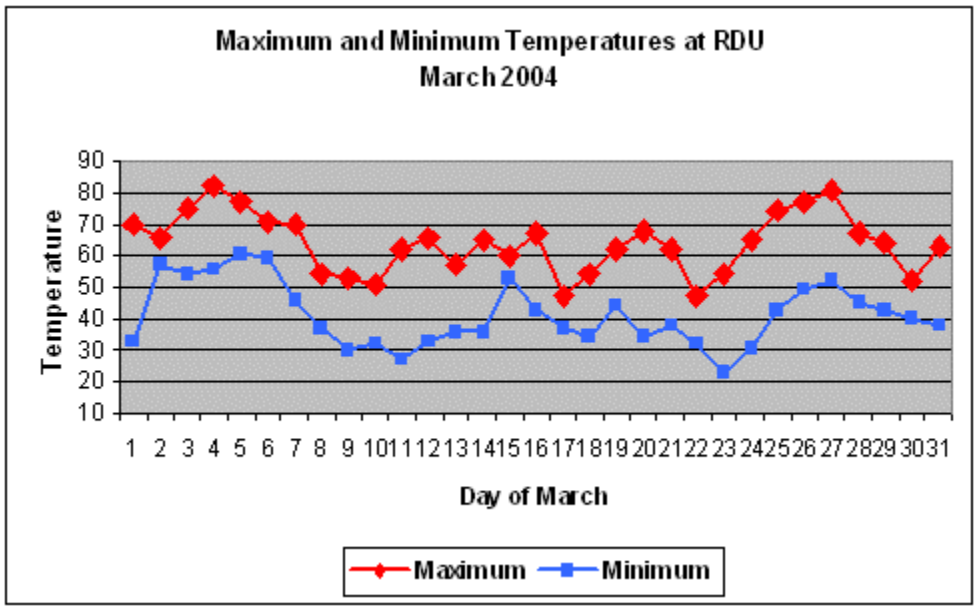

Figure 3 Daily maximum and minimum temperatures observed in March 2004 at Raleigh-Durham (RDU).

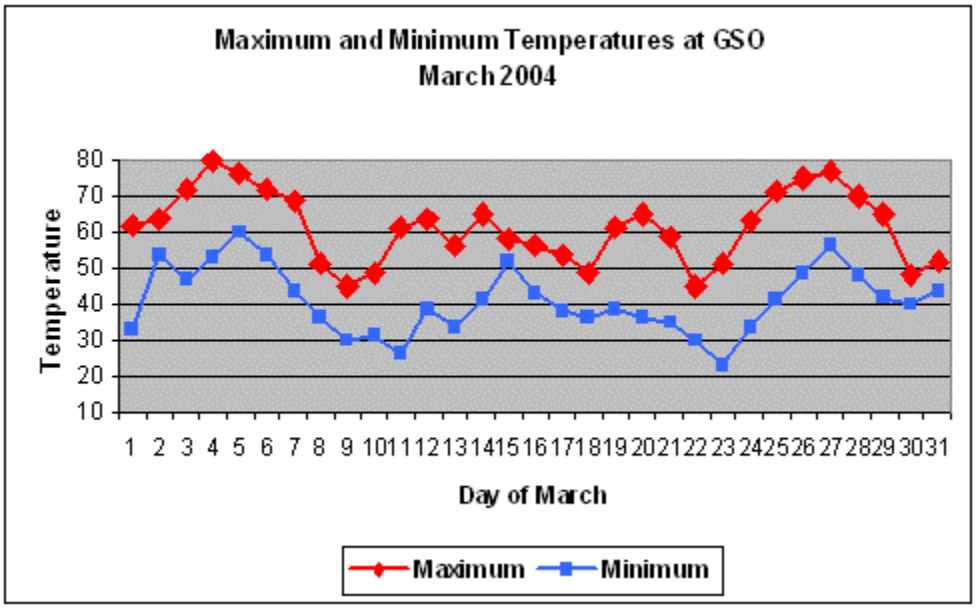

Figure 4 Daily maximum and minimum temperatures observed in March 2004 at Greensboro GSO).

Details

The warmest weather during March 2004 occurred during the first week of the month when daytime high temperatures warmed 15 to 20 degrees above the 30 year climatological normals. Maximum temperatures topped out in the lower 80s over much of the state from just east of the Blue Ridge to just inland of the immediate coast. Most locations experienced their warmest temperatures of the month on the 4th or 5th of March. The following list contains the maximum temperatures observed during the month and the date in which they occurred at selected locations: Asheville 76° (28th), Charlotte 81° (4th), Greensboro 80° (4th), Hickory 79° (4th), Raleigh 82 (4th), Fayetteville 80° (4th), and Wilmington 80° (4th). No daily record highs were set during this warm spell but several stations came within a degree or two of tying their daily records.

The warm period during the first week of the month was short lived as the weather pattern made a dramatic change during the evening of March 7th. An upper level trough developed over the Mid Atlantic states. A cold front, marking the leading edge of a much colder and drier air mass, moved across the eastern U.S. on March 7th and 8th. The cold front was preceded by widely scattered showers and a few thunderstorms which produced only meager rainfall amounts. Despite the lack of rainfall, there were however numerous reports of strong winds (Figure 5). Winds from 45 to 65 mph affected much of the state between 600 PM on March 7th and midnight on March 8th. Downed trees and power lines resulted in over 200,000 customers losing electrical power. This rather unusual occurrence of strong winds, largely not associated with thunderstorms, was due in part to the impact of evaporative cooling. The cooling of the air by precipitation aloft falling into very dry low level air increased wind speeds in the downdrafts associated with the passing showers. These so called “dry downburst” winds are far more common in the western United States.

Additional details on the high wind event are available at…
http://www2.ncsu.edu/eos/service/pams/meas/sco/research/nws/cases/20040307

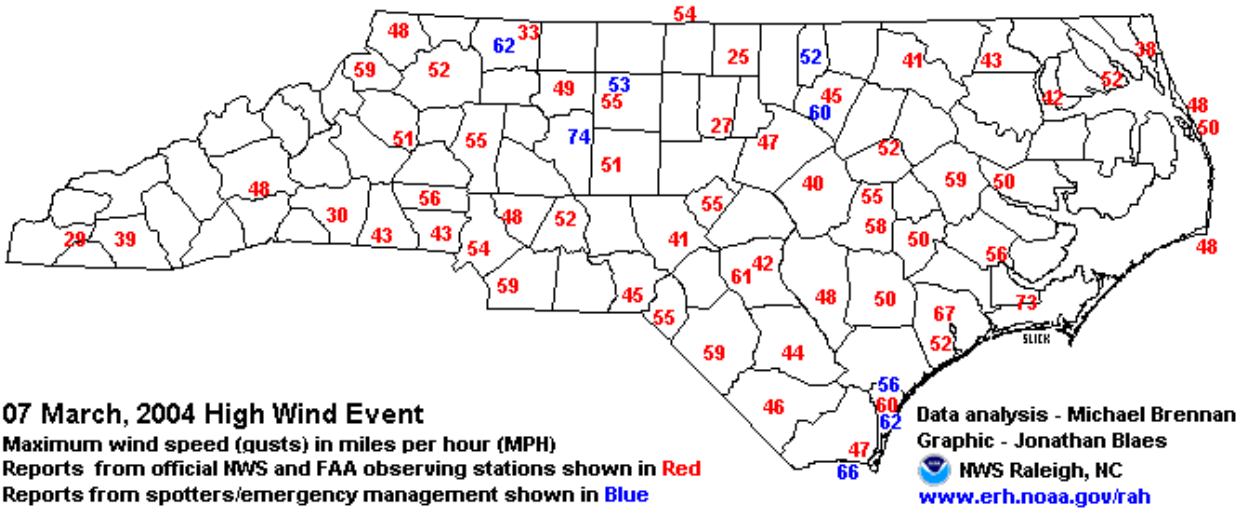

Figure 5 Maximum wind speeds (gusts) in MPH during the evening of March 7th 2004.

The only significant widespread precipitation event in March occurred from March 15th through 17th. The subtropical jet stream became active over the southeastern United States on the 15th as the polar jet stream retreated northward. As the upper level flow became southwesterly over North Carolina, a steady stream of cloudiness and moisture moved across the state. On March 15th, a cold front approached the state and then stalled over North Carolina. On the 16th, a surface low pressure system developed over south central North Carolina (Figure 7), and moved northeastward along the eastern Piedmont into the coastal area early on the 17th. Showers with isolated thunderstorms developed along and north of the track of the surface low. Rainfall amounts during this period generally ranged from 0.50 to 1.0 inches across the northern and eastern sections while rainfall amounts diminished significantly to the south and west (Figure 6). This three day period proved to be the wettest period of the month. At many locations, more than half of the monthly rainfall total occurred from this single event.

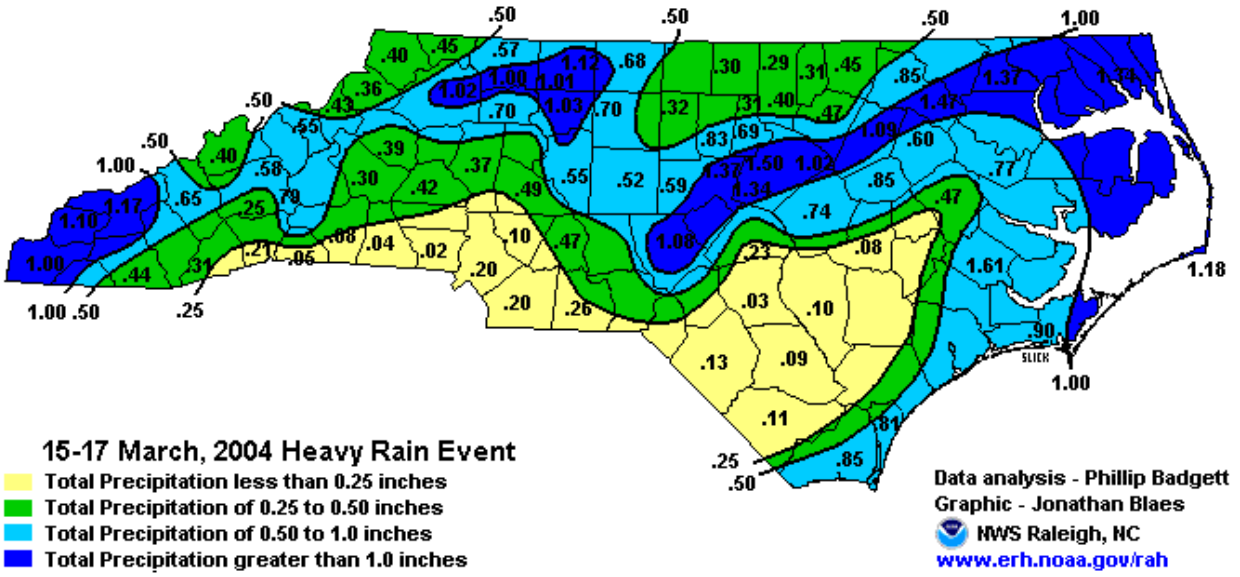

Figure 6 Precipitation totals from March 15th – 17th 2004 across North Carolina.

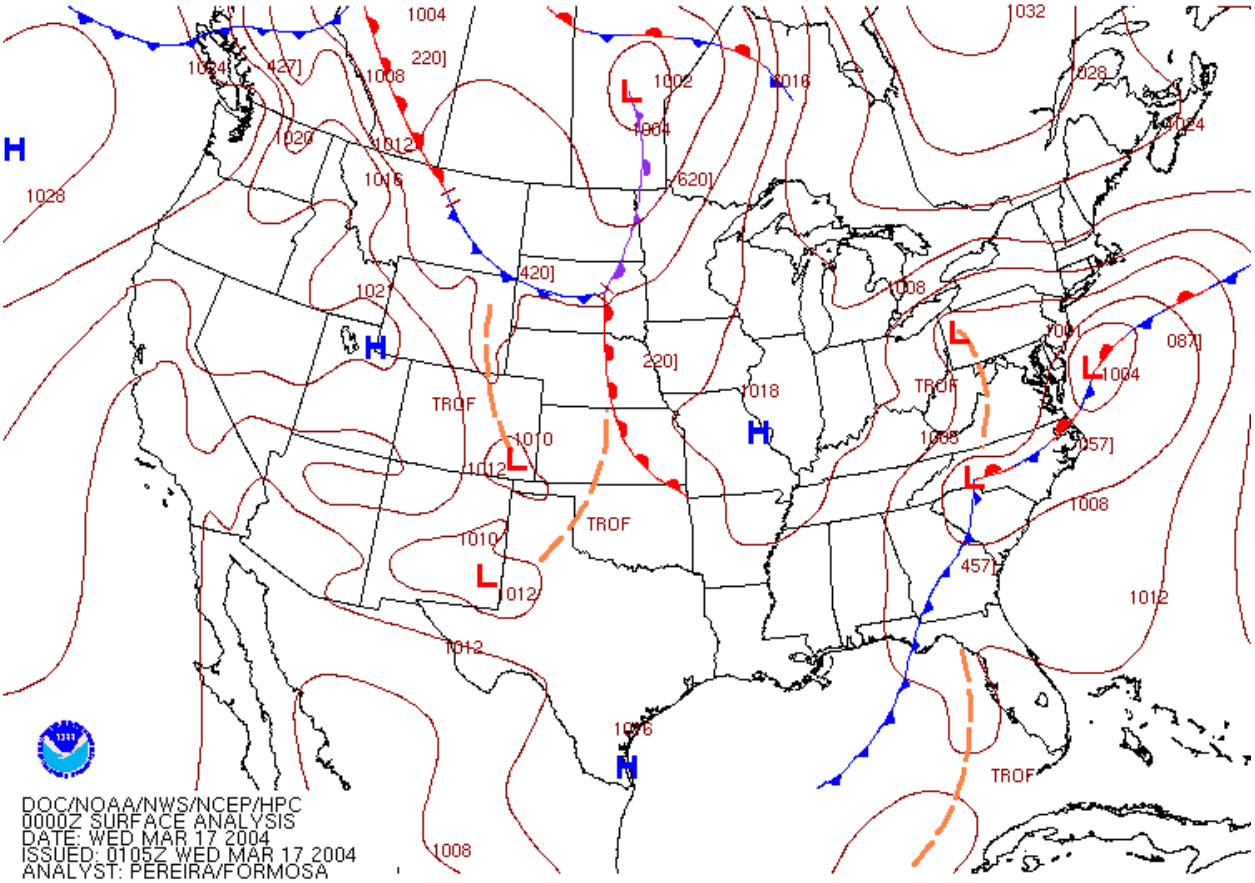

Figure 7 Surface weather map from 700 PM EST Wednesday March 17, 2004

A turn toward significantly colder weather occurred across North Carolina during the end of the third week of March. A deep upper level trough developed over the eastern United States on the 20th and 21st. This allowed a strong arctic high pressure system to surge southward from the Northern Plains into the Carolina's from the 21st through the 23rd. As the center of the high pressure settled over North Carolina on the 23rd, temperatures across the state dropped into the teens and 20s, except for readings in the 30s along the coast (Figure 8). The hard freeze over inland sections presented a problem for some agricultural interests across the Sandhills and Coastal Plain. A few records lows were tied or broken on March 23. Asheville dipped to 18 degrees setting a new record low for the date. Their previous record was 20 degrees set in 1986. Greensboro fell to 23 degrees. This tied the record low that was previously set in 1963.

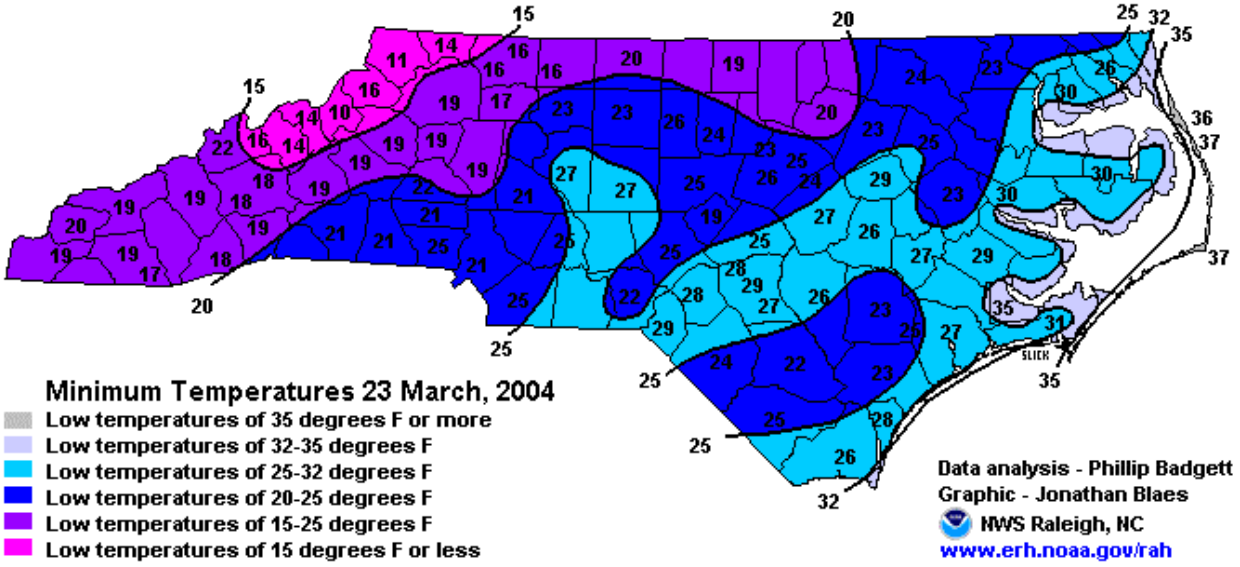

Figure 8 Minimum temperatures on the morning of March 23, 2004.

By the last day of the month, some much needed precipitation returned to the state. A strong upper level low pressure system centered over the Mid Atlantic states extended into the Carolinas on March 31st. Scattered showers and thunderstorms developed over the state during the late afternoon and evening hours. Several of these thunderstorms produced penny to nickel size hail over central North Carolina. There were numerous reports of hail covering the ground, rooftops, and streets in Chatham, Wake, and Vance counties. Figure 9 shows small hail that coated the ground in west Raleigh during the storm.

Figure 9 Photo of small hail that covered the ground in west Raleigh on the evening of March 31st.

In addition to the hail falling from the thunderstorms across central North Carolina on March 31st, there were other forms of frozen precipitation. Snow fell at elevations above 3500 feet across the North Carolina Mountains. The snow was associated with cold air aloft and a northwesterly flow regime that continued into April 1st. Snowfall amounts reached a slushy inch or two at Boone. Between 4 and 7 inches fell at Beech and Grandfather Mountains. The heaviest snow totals occurred at elevations above 6000 feet where on Mount Mitchell nearly a foot of snow was recorded.

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